

ABSTRACT

A method and apparatus provides increased operative life for flip-chip devices that are produced from an integrated circuit formed with electrically conductive bumps bonded to a printed circuit board substrate. The bumps and the substrate are formed from similar materials that allow control of the degree of latency for each element and produce a covalently bonded laminate structure when the bumps and substrate are brought together. The covalently bonded structure decreases bump fatigue to lengthen the operative life of the flip-chip device.